Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/448
BELGIUM
February 1964
Original: FRENCH

Confidential until official release during Conference

Abstract

SHIPPING CASKS FOR THE BR2 AND HFR RESEARCH REACTORS

A. de STREEL and J. VAN MULDERS, Bureau d'Etudes Nucléaires S.A. (BEN), Brussels.

T. de SCHRYNMAKERS de DORMAEL, Bureau d'Etudes Industrielles Fernand COURTOY S.A. (BEI) Brussels.

G. BONNET, C. GARRIC and M. TROUSSON, Euratom, Brussels.

The shipment of irradiated fuel elements raises many problems for the following reasons. On the one hand the technique involved is recent and the calculation, construction and testing methods and procedures are not all already sanctioned by experience and are still subject to improvement. On the other hand, the design must comply with the relatively severe oriteria prescribed by the official pertinent regulations, some of which are still in course of elaboration or subject to subsequent modifications. The main purpose of these regulations is the protection of the public against radiation hazards.

The study of casks for the shipment of spent fuel elements from the BR2 and HFR research reactors, performed by BEN and BEI under contract and in co-operation with Euratom, is described. The HFR cask has already received USAEC approval and is on the point of being accepted by the competent Authority of the United Kingdom; the BR2 cask, designed according to the same principles, is now under examination.

The paper summarises the solutions selected to solve the various theoretical and technological problems to comply, under normal and accidental transport conditions, with the safety requirements prescribed by the new regu-

Translation provided by courtesy of the submitting Government

lations in force, mainly the AEC 10 CFR Part 72 and AIEA regulations.

A description including drawings is given. The technological fabrication problems and the design features and layout selected to ensure the mechanical resistance, the handling, the anchorage, the structural integrity and the shielding are reviewed.

Each cask contains an amount of fuel elements which exceeds the critical number. A solid stainless steel basket, which acts as neutron poison, is used to fulfill the subcriticality requirements. It allows easier decontamination, may be considered as indestructible in the accidental conditions contemplated and acts as internal heat transfer medium in the absence of water coolant.

The problem of residual heat removal, to maintain enough safety margin below the fuel element failure temperature, is investigated from a theoretical point of view. The internal primary coolant is either water or air, and fins are provided for external cooling.

The cask resistance to fire is investigated from the following points of view: critical temperatures, mechanical resistance and shielding effectiveness. A fire protection frame with insulating walls has been devised. This frame, which surrounds each cask, is also useful as shock absorbing and anchoring structure.